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XLIX.—*Notes on the Natural History of East Finmark.* By Canon A. M. Norman, M.A., D.C.L., LL.D., F.R.S., F.L.S.

I had spent three summer holidays in dredging-excursions in South and West Norway, and in 1890 I resolved to go to the extreme north-eastern district of Norway, in order to obtain the more arctic fauna.

East Finmark is a portion of that country which was formerly called Lapland, and commences a little to the east of the North Cape at the Porsanger Fiord. It extends thence to the Russian frontier as its eastern boundary, while to its south lies the northern frontier of Finland.

It is generally known that the extent of the Norwegian seaboard is very great, and is about 2000 miles from Christiania to the Varanger Fiord; but it is not usually realized how greatly the Norwegian coast all the way up trends eastwards, and, of course, directly east after the North Cape has been rounded: so that Vadsö on the Varanger Fiord is not only as far north as Disco in Baffin's Bay and as Icy Cape in Alaska, far within Behring Strait, but also nearly two degrees further east than Constantinople.

The following is the itinerary of my excursion:—

June 17.—Left Newcastle by steamer.
19.—Arrived at Bergen, and left by steamer for north the same evening.
25.—Arrived at Tromsö.
28.—Left Tromsö.
July 2.—Arrived at Vadsö.
10.—Crossed Varanger Fiord to Kirchenes in Sydvaranger.
28.—Returned to Vadsö.
31.—Left Vadsö.
Aug. 6.—Arrived at Svolvær in Lofoten.
11.—Left Svolvær.
18.—Home.

I dredged a little whilst waiting at Tromsö, and on the homeward journey worked for a few days at Svolvær in the Lofoten Islands.

At Tromsö I was joined by Herr J. Sparre Schneider, the friend who was to be my companion and who added so much to the interest and pleasure of my trip. Herr Schneider is the Curator of the Tromsö Museum, and his knowledge of the fauna of arctic Norway, on which he has written so many papers, is unequalled. It was indeed surprising to find at Tromsö, far within the Arctic Circle, a museum in which all departments of the arctic fauna were so fully illustrated and so admirably arranged. At my request Herr Schneider had engaged as my head dredger a young farmer who had a taste for natural history and had sometimes accompanied him in his work at Tromsö. Herr Bersvend Bjerking was a very fine fellow physically, and his invariable good humour, his energy and heartiness in his work, and his never-ceasing attention to myself remain as most pleasant reminiscences.

We left Tromsö, and Herr Schneider thought it well to carry with us in the steamer his small boat fitted for shallow-water work over the 500 (?) miles we had to go, in case there should be any difficulty about boats at our destination. We fortunately, however, had no difficulty in hiring a larger boat at Vadsö and in Sydvaranger. At the latter place our crew was certainly a curiously mixed one, consisting of one Englishman (myself), two Norwegians (Schneider and Bjerking), a Lapp, a Finn, and a Russian.

In the voyage between the North Cape and Vadsö we passed two very famous breeding-places of sea-birds—Svær-

holtklubben and Syltefjordklubben. The high cliffs were perfectly white with *Larus tridactylus*, and when a gun was fired from the steamer to arouse them, the clouds upon clouds of these gulls and other sea-fowl which filled the air were simply astonishing. Two islands at Vardö are also great breeding-places.

Vadsö is an excellent dredging-station, and the fauna, whether of tide-marks, of shallow depths, or of deep water in the middle of the Varanger Fiord, is most interesting. Nevertheless, we were glad to leave it. The inn was miserable, the place horrid to a degree. The cod brought in here in vast quantity are disembowelled and their heads cut off, and while the fish are hung up on lines to dry the refuse is left rotting on the ground, until it is gathered up in carts and carried to the fish guano manufactory to be boiled down. The stench from the chimney of that manufactory was unbearable. Herr Schneider suggested that we should cross the Varanger Fiord to Sydvaranger, in the hope of being able to find quarters with a landowner at whose house he had previously stayed when on an entomological expedition. This we did, and in the hospitable and commodious house of Herr H. Figenschou found ourselves in the lap of luxury for so outlandish a place. Here was every comfort and kind attention from our good host and his wife, with excellent food—though, of course, fresh meat was not to be expected every day, where it must of necessity be home-killed. "Kirchenes" with its owner's family and its guests—for there were several others besides ourselves—can never be forgotten.

Here at Sydvaranger we were within 7 miles of Russia. All fellow voyagers had been left behind, and among these had been some most interesting companions. During the short summer months many of the government officials appear to go to the furthest north to carry out their inspections. Thus, before coming to Sydvaranger we had met the Harbour Director, the Inspector of Fisheries of Norway, the Inspector of Inland Fisheries of Finland, the head of the Geological Survey, the Professor of Chemistry, Herr Svend Foyn (the great whale-hunter), and others of interest, besides English salmon-fishers, for the rivers of East Finmark are famous for their salmon.

Sydvaranger is, however, beyond the range of ordinary or almost any travellers. Ornithologists have been there; entomologists, especially my friend Herr Schneider, have done excellent work in the district; botanists have added species to the Norwegian flora and worked well there; but the only

marine zoologists* who had previously collected in the fiords, as I was informed by Herr Schneider, were Nylander and Gadd, who, in 1855, gave what they had found to the Helsingfors Museum, but did not publish anything on the subject.

The sun never set while we were in East Finmark. Schneider was often entomologizing and I botanizing until near midnight.

I may here add that when dredging we always landed at some spot which had not previously been visited, to have a midday meal and to give our men an hour or an hour and a half's rest. While they were resting Herr Schneider was busy with his net after insects, and more especially Bombyces, which were very abundant and especially affected *Vicia cracca*, a very common vetch of the district, and which there grows with a luxuriance which I have not seen equalled in our own islands. While Schneider was collecting insects I was intent on the botany of the spot.

Geography and Geology.

Norway is divided into Stifts, Amts, and Fogderier. A Stift is a Diocese, and the whole of Norway north of lat. 65° 15′ N. is comprised in the Stift of Tromsö. This great Diocese contains three Amts—Nordland, Tromsö, and Finmark. Of these, Finmark is divided into five Fogderier—Altens, Hammerfest, Tana, Vardö, and Varanger. The first two of these Fogderier belong to West Finmark and the last three constitute East Finmark. East Finmark, as has been already stated, extends from the Porsanger Fiord, which is the next large fiord to the east of the North Cape, to the Russian frontier. Beyond Vardö, the most eastern point, the coast-line trends southward and then westward, forming the large Varanger Fiord, the entrance of which thus faces eastward. The northern shore of the Varanger Fiord is known as Nordvaranger, and here is situated the famous whale-fishing station Vadsö. The territory on the southern side of the Varanger Fiord is Sydvaranger. Running inland to the south from Varanger Fiord is Bog Fiord, which ultimately becomes forked, the western fork being Lang Fiord and the eastern Klosterelv Fiord. On the projecting land which forms these last-named fiords is situated Kirchenes, where we had our quarters. At the head of Klosterelv Fiord is Elvenes, at the mouth of the Pasvik River, which river throughout the greater part of its

* Except M. de Guerne, for whose expedition see observations in succeeding part of this paper.

length from Lake Enara is the boundary between Norway and Russia. A mile or so above Elvenes, however, the Russian boundary crosses the Pasvik, in order to take in a very ancient and highly prized chapel of Boris Gleb, which Russia insisted on possessing. By the kind invitation of Madame Prebensen, the wife of the Amtmand (=a sort of Lord Lieutenant, but with much more extended powers), who was staying at Elvenes, I accompanied her to Boris Gleb, where we were most hospitably entertained by the Russian priest. The little old chapel, now no longer used, with the ancient vestments preserved in it, is very interesting. The inhabitants of the little village are Lapps, who belong to the old Greek Church *, and retain many curious old customs. They do not smoke; they will not eat or drink out of any vessel which has been used by those not of their peculiar faith. Formerly there were castrati among them for the Kingdom of God's sake; but this rite is no longer practised, unless secretly, since it has been forbidden by the government. The priest does not, of course, share these old superstitions and views.

The population of East Finmark embraces a mixture of Norwegians, Fins, and Lapps.

The Fins or Quains are as tall as Norwegians, and well-made men. They have usually little or no hair on the chin or cheeks, and but slight moustache; the hair is light or brown, less often dark, the cheek-bones usually high, and the eyes mostly of a cold blue colour.

The Lapps are short, and their average height not more perhaps than 5 feet. There are three sections of them:—

(*a*) Mountain or Nomadic Lapps. These are the purest breed. They are characterized usually by broad faces and dark hair, and are very commonly bow-legged. They live in tents, or, in winter, in temporarily constructed huts—wandering from place to place, in order to procure the reindeer-moss or other food for their herds of reindeer. Their clothes are chiefly made from the skins of those animals.

(*b*) River Lapps. These reside in the river-valleys of the extreme north. They are agriculturists, cultivating the land and having their cattle and sheep, and also feeding on the salmon in which the rivers (*e. g.*, Tana) abound. The only reindeer they have are for use in sledging.

(*c*) Sea Lapps. These reside on the coast and fish in the

* All Lapps in Russia belong to the Greek Church; but those who live in the Swedish and Norwegian parts of what used to be called Lapland are Lutherans.

sea. With Sea Lapps Norwegians occasionally intermarry, but very rarely with Nomadic Lapps. When on my voyage north we stopped at Hammerfest, a Norwegian companion with whom I became acquainted on board lionized me through this most northern town in the world, showing me its reservoir, fountain, buildings, &c. It was Sunday morning. The bell was ringing for service, and the Sea Lapps were trooping to it; their dress was extremely pretty and picturesque, consisting of white flannel bound with crimson or bright blue. I was much pleased with the place, and resolved on my homeward journey to stop there for a week's dredging. The entire town, with all its warehouses and church, was built of wood. Only a week later news came to us at Vadsö that the whole town had been destroyed by fire. When the steamer touched there on my return voyage not a single house or building remained. The coal-heap by the wharf was still burning; all else was blackness and ruin. I went to where the church had stood, and there found and brought away a piece of the melted bell which I had heard summoning the Lapps to their morning service.

There is an affinity between the languages of the Lapps and Quains; but they differ entirely from all other European languages, the nearest perhaps being Hungarian.

Norway is, as it were, a skeleton. Denudation during the Glacial Epoch has been carried to an extreme; almost all sedimentary rocks have been swept off into the sea, and primary rocks for the most part alone remain. It is this which gives such a peculiar facies to the scenery within vision, for as we steam along the entire coast roches moutonnées everywhere meet the eye. Here and there, of course, some sedimentary rocks are still to be found. One of the most important deposits in northern Norway is on the outlying island of Ando, lat. 69°, which is at the northern extremity of Nordland. In this island there is a small Jurassic deposit characterized by such fossils as *Ammonites, Belemnites Blainvillei*, Desh., and *brevicornis*, Voltz, *Gryphæa dilatata*, Sow., several *Pectens*, *Lima duplicata*, Sow., *Astarte excavata*, Sow., *Scleropteridium Dahllianum*, Heer, *Pinus Nordenskiöldi*, Heer, *P. microphylla*, Heer, &c., &c. There is also here a seam of inferior coal.

Other small deposits of secondary rocks occur here and there on the islands to the north of this; but on the mainland up to Hammerfest and the North Cape we meet with igneous rocks, gneiss, granite, and serpentine. At the North Cape first appears a series of rocks of unknown horizon called the

"Gaisa" * system. It consists of two series—an upper, which is continued from the North Cape along the East Finmark coast as far as the Tana Fiord; and a lower series, commencing on the eastern side of the Tana Fiord and extending thence to Nordvaranger. The "Gaisa" system is composed of conglomerates embracing lumps of sandstone, quartz, granite, dolomite, &c. Up to the time of my visit all attempts to find embedded fossils in the fragments of these conglomerate rocks, and thus obtain a clue to their age, had been unavailing. A beautiful section of these rocks was seen from the steamer as we passed Kjolle and Ox Fiords, the strata presenting layers of very varied and lovely colouring. The geological formation at Vadsö and the northern shores of the Varanger Fiord consists of "Gaisa," with some glacial deposits here and there along the shore; but on crossing the fiord to Sydvaranger this interesting formation is left behind and the rocks are again igneous. This geological change, of course, cannot be without exhibiting effects on the flora and perhaps also on the fauna of the fiords.

The chief factor, however, which influences the fauna of East Finmark consists in the difference of climate. West Finmark, up to the North Cape and beyond it, is indebted to the influence of the Gulf Stream for a temperature all through the winter months which keeps the sea free from ice. The climatic conditions of the Varanger Fiord are, however, very different, and the smaller fiords, such as those of Sydvaranger, where my dredging was chiefly carried on, are completely frozen over from December or January to the middle of May or into June, the ice attaining a thickness of 2 to 3 feet. As a necessary consequence the fauna of the Varanger Fiord and of the other fiords of that district is of more arctic character than that round the North Cape, although in latitude the latter is somewhat more northern. In the summer months the difference of temperature is evidenced by the dense fogs which are commonly met with off the coast of East Finmark, and which are the result of contact of the warm air coming from the west with the cold currents passing westward from the Kara Sea. It was in one of these fogs, during which we had to lie to for twenty-seven hours, that while other passengers were filling great tubs with the cod which so freely took the bait, I employed my time in casting from the deck of the steamer a little hand-dredge off the mouth of Laksefjord, and thus obtained animals some of which are recorded as from that locality in the following notes.

* Gaisa, the name of a mountain in the Porsanger district.

MAMMALIA.

The following notes on a few of the mammals were given me in conversation by Herr J. Sparre Schneider when we were together in Finmark.

Ursus arctus, Linn. (Brown Bear.) Occurs through Norway; abundant in the valleys of Tromsö Amt, but scarce in East Finmark.

Gulo luscus, Linn. (Glutton.) Common in East Finmark, as throughout mountains of Norway.

Mustela martes, Linn. (Pine-Marten.) Occurs in West Finmark and perhaps in East.

Putorius ermineus, Linn. (Ermine.)

Canis lupus, Linn. (Wolf.) Common in East Finmark, but almost extinct in the rest of Norway. It comes in numbers on the ice in winter on the Pasvik River. Nine were killed one night by Herr Figenschou about five years before I was staying with him.

Vulpes alopex, Linn. (= *V. vulgaris*, Briss.). (Common Fox.) Common.

—— *lagopus*, Linn. (Arctic Fox.) Found throughout Norway, but most abundant in mountains of Finmark. Two hundred were killed by poison in one winter at Vadsö some years ago.

[*Felis lynx*, Linn. (Lynx.) Does not occur in East Finmark. It has been killed in West Finmark, and is most abundant in the neighbourhood of Trondhjem, coming into the outskirts of the town in the winter months.]

Trichechus rosmarus, Linn. (Walrus.) Has been seen rarely in Finmark.

Halichœrus grypus, Fabr. (Grey Seal.) Breeds at Trondhjem, but does not now reach East Finmark, although bones of it have been found there.

Erignathus barbatus, Fabr. (Great Seal.)

Phoca vitulina, Linn. (Common Seal.)

—— *fœtida*, Fabr., = *P. annellata*, Schinz, = *P. hispida*, Schreb. (Marbled Seal.)

Pagophilus grœnlandicus, Fabr. (Greenland Seal.)

Lemmus norvegicus, Desm. (Lemming.)

Evotomys ruficanus, Sund.

Microtus ratticeps, Keys. & Blas. No rat or house-mouse occurs in East Finmark.

Alces machlis, Gray. The Elk is now altogether absent from, or, if present, very rare in, East Finmark, nor is it found on the west coast of Norway. It is still abundant about Namsos and a little further north.

Rangifer tarandus, Desm. All the Reindeer in East Finmark are now tame. They are still wild in the Hardanger district and in the central range of mountains.

Megaptera boops, Linn. Not so common as the two following.

Balænoptera musculus, Linn. This and the next are the two great whales, measuring when adult 70–80 feet in length, which chiefly occur at Vadsö.

—— *Sibbaldii*, Gray.

—— *borealis*, Lesson. Sporadic at Vadsö, more common in West Finmark.

—— *rostrata*, Fabr. Smaller species; not hunted, caught in nets and often shot. Chiefly found in Bergen district, occasionally in East Finmark.

Balæna biscayensis, Gray. Extinct in East Finmark for some 200 years (?); bones found at Vadsö and Sörö.

Hyperoodon rostratus, O. F. Müll. (Bottle-nosed Whale.) Chiefly killed in Arctic seas, but occurring in ice-floes to the north of East Finmark.

Monodon monoceros, Linn. (Narwhal.) Killed once in Varanger Fiord about eighty years ago.

Delphinapterus leucas, Pallas. (White Whale.) This species, the inhabitant of the seas of Nova Zemblia, Spitsbergen, Greenland, and N.E. America, has occurred off the East Finmark coast.

Orca gladiator, Laplace. (Grampus.) Rarely killed. It swims in herds and attacks the great whales.

Globocephalus melas, Traill. Occasional; chiefly enclosed by nets in narrow fjords and then shot. As many as 2500 have been killed at Lofoten at one time.

Lagenorhynchus albirostris, Gray. Occurs throughout the whole of Norway.

The whales which are chiefly killed for oil are *Megaptera boops*, *Balænoptera Sibbaldii*, *musculus*, *borealis*, and *rostrata*. Some years ago Vadsö was the great centre of Norwegian whale-fishery; I have a note (but do not remember whence it was taken, and therefore, though I believe it to be correct, I cannot vouch for its accuracy) that in 1884 450 whales were killed, in 1885 1398, and in 1886 954. When the fishery was at its height the harbour of Vadsö was covered with floating oil, and the stench from the dead whales must have been something frightful. The fishery at Vadsö was at the time of my visit closed; but the fishery was still continued at Mehavn, Sörö, and Jan Fjord. But the whales are now scarce. I only saw one which had been killed and perhaps half a dozen alive spouting. Their great destruction has been due to the mode of slaughter invented by the well-known

Herr Svend Foyn, whom I saw as an old man, and who has since died. He hunted the whales in steamers of about 80 tons, with engines of about 30 horse-power, shooting the whales with harpoons to which were attached cartridges, which, exploding, blew holes in the whales' sides.

MOLLUSCA.

The following catalogue contains all the Mollusca which are known to occur in East Finmark. The species found by myself have a locality attached; species of which the name only is given are inserted on the authority of G. O. Sars and others; species in this and other lists which have a * prefixed were procured by me in 1890 either at Tromsö or Svolvær, Lofoten Islands, but not in East Finmark.

Cephalopoda.

The following seven species are recorded by G. O. Sars:—

Ommastrephes sagittatus, Lamarck.
Gonatus amœnus, Lichtenstein.
Rossia glaucopis, Lovén.
Octopus arcticus, Prosch.

Pteropoda.

Limacina helicina, Phipps.
—— *balea*, Möller.
Clione limacina, Phipps.

Gastropoda.

**Tornatina nitidula*, Lovén. Svolvær, Lofoten, 5–10 fathoms.
—— *pertenuis*, Gould. Vadsö, in 5–25 fathoms; Klosterelv Fiord.
Cylichna alba, Brown. Very common in East Finmark.
var. *corticata*, Beck. Vadsö and Sydvaranger.
—— *propinqua*, M. Sars. In shallow water at Vadsö and in all the Sydvaranger fiords.
Diaphana hyalina, Turton. Vadsö and Klosterelv Fiord.
—— *globosa*, Lovén,=*hyemalis* (Gould), G. O. Sars. Bog and Klosterelv Fiords, but only a single specimen in each locality.
Scaphander punctostriatus, Mighels.
Philine finmarchica, M. Sars. Bog Fiord.
—— *quadrata*, S. Wood. Lang Fiord, very fine specimens.
*—— *scabra*, Müller. Lofoten.
—— *lima*, Brown. Vadsö and Bog Fiord.

Philine fragilis, G. O. Sars.

Acanthodoris pilosa, Müll. Tide-marks, Vadsö.

Lamellidoris muricata, Müll. Tide-marks, Vadsö.

—— *bilamellata*, Linn. Vadsö Sound.

Doris obvelata, Müll. Tide-marks, Vadsö.

Issa lacera, Müll.

Dendronotus frondosus, Ascanius. Vadsö.

—— *velifer*, G. O. Sars.

Æolidia papillosa, Linn. Vadsö.

Limapontia capitata, Müller. Tide-marks, Vadsö.

Bela pyramidalis, Ström. Vadsö and fiords of Sydvaranger; also Lofoten.

var. *semiplicata*, Sars. Vadsö.

—— *Pingelii*, Beck. Harbour at Vadsö, and in a bay west side of Bog Fiord.

—— *rugulata*, Troschel. Abundant.

var. *assimilis*, G. O. Sars. Bog and Lang Fiords.

—— *nobilis*, Möll. Varanger and Sydvaranger Fiords.

—— *scalaris*, Möll. Lang Fiord, 5–15 fathoms, one large living specimen; Vadsö Harbour, one dead.

—— *exarata*, Möll.,=*mitrula*, Lovén. The most abundant *Bela* in the district.

—— *obliqua*, Möll. One living specimen in Lang Fiord, 5–15 fathoms.

—— *cancellata*, Migh.,=*elegans*, Sars. Klosterelv and Lang Fiords.

var. *declivis*, Lovén. Much more frequent than the type, Varanger and Sydvaranger Fiords.

—— *Trevelyana*, Turton. Varanger Fiord, down to 125 fathoms; fiords of Sydvaranger and also Lofoten.

—— *decussata*, Couthouy,=*viridula*, Möll. Vadsö and Bog and Lang Fiords.

var. *conoidea*, G. O. Sars.

—— *tenuicostata*, M. Sars. One only in Bog Fiord, 100–125 fathoms.

—— *harpularia*, Couthouy. Vadsö, Bog and Lang Fiords, 5–30 fathoms.

—— *Kobelti*, Verkrüzen,=*B. viridula*, G. O. Sars (non Möll.). Varanger Fiord, east of Vadsö, in 10–25 fathoms.

—— *cinerea*, Möll.

—— *bicarinata*, Couthouy.

var. *violacea*, Migh. In all the fiords and at Lofoten in 5–30 fathoms.

Bela bicarinata, var. *cylindracea*, Beck. One living in 100–120 fathoms, Bog Fiord.

—— *angulosa*, G. O. Sars.

—— *simplex*, Midd.

—— *expansa*, G. O. Sars.

**Clathurella linearis*, Montagu. Svolvær, Lofoten.

Typhlomangelia nivalis, Lovén.

Spirotropis carinata, Phil.

Teretia amœna, G. O. Sars. A living specimen, Varanger Fiord, 125–150 fathoms.

Taranis cirrata, Brugnone, = *T. Mörchi*, Malm. Klosterelv and Bog Fiords, 5–10 fathoms.

Admete viridula, Fabr. Throughout the district, and of larger size than it attains in West Norway; reaches 16 millim. in length.

var. *undato-costulata*, Verkrüzen. Vadsö and Sydvaranger, and as large as the types.

Trophon truncatus, Ström. Living between tide-marks at Vadsö, and dredged in 5–30 fathoms in all the Sydvaranger fiords examined.

—— *clathratus*, Linn. In all the fiords down to 120 fathoms.

var. *Gunneri*, Lovén. Varanger, Lang, and Bog Fiords, 15–80 fathoms.

—— *barvicensis*, Johnston. "Porsanger Fiord" (*fide* Friele).

Purpura lapillus, Linn., and var. *imbricata*, Lamk. Vadsö, of a rich purplish-brown colour.

Astyris rosacea, Gould. Lang, Klosterelv, and Bog Fiords, and at Svolvær, Lofoten, 5–50 fathoms.

Nassa incrassata, Ström. Svolvær, Lofoten. Recorded by G. O. Sars from East Finmark.

Boreofusus berniciensis, King.

Volutopsis norvegica, Chemn.

Ukko Turtoni, Bean. Vardö, fishermen's lines.

Neptunea despecta, Linn. Bog Fiord; Vardö, fishermen's lines; Svolvær, Lofoten.

Sipho gracilis, Da Costa, var. *glabra*, Verkr. Vardö, from fishermen's lines.

—— *islandicus*, Chemn. Vardö, fishermen's lines.

—— *latericeus*, Müll. Varanger Fiord, 100–125 fathoms, and Lang Fiord, 3–30 fathoms.

Siphonorbis Verkrüzeni, Kobelt.

—— *lachesis*, Mörch.

—— *tortuosus*, Reeve.

var. *turritus*, M. Sars. Vadsö.

Siphonorbis ebur, Mörch.

—— *fusiformis*, Brod.

Buccinum undatum, Linné.

var. *borealis*, nov. nom.,=var. *pelagica*, G. O. Sars (but not var. *pelagica*, King). Vadsö, in shallow water. The nearest approach to the form that we have in British seas is var. *flexuosa* of Jeffreys, from Shetland, which it resembles in its elongated form and flexuose ribs; but the latter is a much more delicate and in all respects more elegant form.

var. *cærulea*, G. O. Sars. This variety is found at low water at Vadsö; the substance of the shell is commonly of a rich vinous-purple colour, which is especially evident on the columella. Sars says of the colouring "fusco-cærulea, faucibus intense nigro-castaneis." The ribs are often almost entirely absent on the lower whorls. It passes into var. *borealis* at a few fathoms depth.

var. *Schneideri*, Verkrüzen. A beautiful pure white form which comes up very constantly on the fishermen's lines at Vardö. I have seen half-grown specimens which might pass for the rare white variety of var. *zetlandica*; but the form is much less produced than in that variety from the Shetland Haaf; the whorls are more tumid and the ribs much more developed. Occasionally pure white examples of var. *zetlandica* occur; but in the case of var. *Schneideri* the whole race is a pure white one—at least, I did not see any similar specimens of a different colour on the quay at Vardö.

Buccinum finmarchianum, Verkrüzen. This beautiful species is brought up in great numbers by the Vardö fishermen's lines; among a large number which I procured at Vardö there was a single white specimen. I have an example in my cabinet, kindly given me by Herr Schneider, which is no less than 80 millim. long; it is referable to var. *attenuata*, G. O. Sars; 60 millim. may be considered as the ordinary limit of measurement of a full-grown shell. Sars gives as measurement of the usual form 55 millim., of var. *attenuata* 58 millim., of var. *scalaris* "Long. usque ad 65 mm."

Buccinum grœnlandicum, Chemnitz. Between tide-marks, Vadsö.

var. *nuda*. I propose this name for a remarkable form of *Buccinum* to be found on the outer side of the island which shelters the harbour of Vadsö. The form is more evenly conical than *grœnlandicum*, the whorls usually being flatter and the suture less deep. In general the whorls are perfectly smooth, without any trace of ribs, riblets, or puckers; but in other cases flexuous ribs are, more or less, developed on all the whorls accompanied by spiral riblets, and the resemblance to *B. undatum* becomes so exact that such a specimen taken by itself might be ascribed by a conchologist as being without doubt a small variety of that species. The

colour varies greatly: some are pure white, others rich purple, others mottled with rufous spots on a paler yellowish ground. The length of full-grown specimens is an inch and a half. I have left to the last the important character which distinguishes it so markedly from *B. grœnlandicum*: the *epidermis is perfectly smooth*, and at no age, nor on any specimen that I have seen, could a trace be found of the longitudinal epidermal pleats, crowned with backward directed setose processes, which are so characteristic of *B. grœnlandicum*. It is not *B. parvulum*, Verkrüzen, it is not at all like his figures, nor has it anything to do with a specimen in my collection which came thus named from him indirectly to myself, and which agrees perfectly with his figures, and has the seta-crowned epidermal pleats of *B. grœnlandicum*. I previously, however, had the form *nuda* in my collection (*a*) from Professor G. O. Sars, and (*b*) from Verkrüzen, labelled in his writing "*Buccinum* ? n. sp., Finmark occidentalis"; and also a shorter form of the same thing, with the mouth somewhat more expanded, received from Prof. Sars, "*Buccinum grœnlandicum*, var. *patula*." I am rather inclined to believe that this form is not, in the ordinary sense of the term, a variety, but that it is a hybrid between *B. undatum* and *B. grœnlandicum*. The conditions under which it occurs are curious. The island to which I have referred is only a little place. At its north-eastern corner between tide-marks *B. undatum*, var. *cærulea*, G. O. Sars, is found accompanied by ordinary *B. grœnlandicum*. A little further round—though really close by—for perhaps a hundred yards or so, var. *nuda* occurs in the greatest profusion; and beyond this again *B. grœnlandicum* takes its place with the usual epidermis. The purple colour so prevalent in var. *nuda*, but totally absent in the normal forms, is exactly the same colour which is so marked in Sars's *B. undatum*, var. *cærulea*.

Buccinum hydrophanum, Hancock, var. *tumidulum*, G. O. Sars. Varanger Fiord in 100–150 fathoms.

Odostomia turgida, G. O. Sars.

—— *turrita*, Hanley.

—— *unidentata*, Mont.

Liostomia eburnea, Stimpson. Vadsö, in 10–25 fathoms.

Pyrgulina eximia, Jeffreys.

—— *spiralis*, Montagu.

Eulima bilineata, Alder. Entrance to Vadsö Harbour.

Scalaria grœnlandica, Möll. Vadsö and Svolvær, Lofoten, 10–25 fathoms.

var. *Loveni*, G. O. Sars. One only. Lang Fiord, 15–25 fathoms.

var. *crebricostata*, G. O. Sars. One only. Varanger Fiord, 100–125 fathoms.

Scalaria obtusicostata (S. Wood), G, O. Sars.

Lœocochlis granosa, Wood.

Cerethiopsis costulata, Möll. Lang Fiord, 30 fathoms; Bog Fiord, 20–30 fathoms.

Newtoniella metula, Lovén.

Turritellopsis acicula, Stimpson. Vadsö and Varanger Fiord, in shallow water to 15 fathoms.

Trichotropis borealis, Brod. & Sow. Lang and Bog Fiords and also Lofoten, down to 80 fathoms.

—— *conica*, Möll.

Littorina littorea, Linn. Vadsö, Lang Fiord, &c.

—— *rudis*, Maton, var. *grœnlandica*, Möll. Extremely abundant. When found near or quite at high-water mark on rocks it is of smaller size than when living lower down, and at the same time more richly coloured. The colour is very variable: pure white; white banded with black or brick-red; grey; grey mottled with dispersed yellow spots; black; black banded with white. A form taken in Bog Fiord has the spire more elevated than usual, and corresponds to our English var. *tenebrosa*. The surface of the shell is usually smooth or sculptured only with slightly elevated spiral ridges. At Vardö, however, a large variety occurs which is girt with strong spiral ribs, and is quite indistinguishable from *Littorina sitchana*, Philippi, from Vancouver and the Behring Sea. It is figured by Sars, Moll. Reg. Arct. Norv. pl. ix. fig. 10.

*—— *obtusata*, Linn. Occurs of quite the normal British form and appearance at Svolvær, Lofoten. In East Finmark it gives place to the following very remarkable varieties:—

var. *palliata*, Say, Sars, pl. ix. fig. 9. Tromsö, Vardö, Vadsö, &c.

forma *elatior*, Sars, pl. xxi. fig. 19, has the spire so much elevated that it has the shape of *L. rudis*; it occurs between tide-marks not far from low-water mark at Vardö.

forma *coarctata*, Sars, pl. xxi. fig. 20. This extraordinary shell occurs with the last at Vardö, and is indeed an extreme form of forma *elatior*, with which, and with *palliata* of ordinary form but of large size, it is found.

Lacuna pallidula, Da Costa. Tide-marks, Vadsö.

—— *divaricata*, Fabr., var. *solidula*, Lovén. Vadsö and Bog and Klosterelv Fiords.

var. *frigida*, Lovén. Klosterelv Fiord. In both these varieties the specimens have been compared with cotypes received from the late Professor Lovén.

Skenea planorbis, Fabr. Vadsö; Klosterelv Fiord and Svolvær.

Hydrobia minuta, Totten.

**Rissoa parva*, Da Costa. Svolvær. The type not from East Finmark.
var. *interrupta*, Adams. Vadsö and Svolvær.

Alvania Jan-Mayeni, Friele. Varanger Fiord, in 100–125 fathoms. New to the Norwegian fauna.

—— *Jeffreysii*, Waller.

Cingula castanea, Möll. Lang Fiord, in 5 fathoms.

—— *tumidula*, G. O. Sars.

Onoba striata, Adams, var. *saxatilis*, Möll. (=*aculeus*, Gould). Tide-marks and shallow water, Vadsö; Lang and Bog Fiords; Svolvær.

Jeffreysia globularis, Jeffr. Klosterelv and Lang Fiords, 5–15 fathoms.

Homologyra atomos, Philippi.

Velutina lævigata, Penn. Lang and Bog Fiords.

—— *lanigera*, Möll.

Morvillia undata, Brown. Lang Fiord.

Velutella flexilis, Mont.

—— *cryptospira*, Midd.

Marsenia prodita, Lovén.

—— *micromphala*, Bergh.

—— *grœnlandica*, Möll.

Onchidiopsis glacialis, M. Sars.

Natica affinis, Gmel.,=*N. clausa*, Brod. & Sow. In all the East Finmark Fiords and at Lofoten.

**Lunatia Alderi*, Forbes. Svolvær.

*—— *Montagui*, Forbes. Svolvær.

—— *grœnlandica*, Beck. Lang and Bog Fiords and Svolvær, 5–120 fathoms.

—— *nana*, Möll. Vadsö, in 10–50 fathoms.

Amauropsis islandica, Gmel. Vadsö and middle of the Varanger Fiord, 10–125 fathoms.

Calliostoma occidentale, Migh. & Ad. Bog Fiord, 20–30 fathoms.

Machæroplax obscura, Couth.
var. *bella*, Verk. Varanger, Lang, Bog, and Klosterelv Fiords, in shallow water.
var. *albula*, Gould. Vadsö, in 10–25 fathoms.

—— *varicosa*, Migh. Vadsö and Bog Fiord.

**Gibbula cineraria*, Linn. Svolvær.

—— *tumida*, Mont. Svolvær; and given to me by Herr Dahl, of Vardö, as from that place.

Margarita grœnlandica, Chemn. In all the East Finmark Fiords, at Tromsö, and at Svolvær.
var. *lævior*, Jeffr. With the last.

Margarita olivacea, Brown. Varanger, Lang, and Bog Fiords.
—— *cinerea*, Couth. Throughout the district from shallow water to 125 fathoms.
—— *helicina*, Phipps. Vadsö; Lang and Bog Fiords.
Mölleria costulata, Möll. Vadsö; Lang, Bog, and Klosterelv Fiords.
Cyclostrema Petterseni, Friele. Klosterelv and Bog Fiords in shallow water.
Scissurella crispata, Flem. In all the Sydvaranger Fiords.
Puncturella noachina, Linn. Throughout the district.
Lepeta cæca, Müll. Throughout the district.
Pilidium fulvum, Müll.
Acmæa virginea, Müll. Varanger, Klosterelv, and Bog Fiords; and at Svolvær.
—— *testudinalis*, Müll. Vadsö and Sydvaranger Fiords.
—— *rubella*, Fabr.

Polyplacophora.

Tonicella marmorea, Fabr. Throughout the district, but small.
Trachydermon ruber, Lowe. Common everywhere, but small.
—— *albus*, Linn. Throughout the district.
Leptochiton arcticus, G. O. Sars. Vadsö and Lang Fiord.
Hanleyia debilis, Gray. Lang Fiord; one very fine, measuring 22 millim. when dried. It thus approaches *H. abyssorum*, M. Sars.

Scaphopoda.

Dentalium entalis, Linn. Vadsö; Lang and Bog Fiords.
—— *occidentale*, Stimpson. Vadsö.
Siphonodentalium vitreum, M. Sars. Varanger, Lang, and Bog Fiords, down to 125 fathoms.

Pelecypoda.

Anomia ephippium, Linn. Varanger and Klosterelv Fiords.
var. *aculeata*, Müll. Svolvær. Sars records it from East Finmark.
Pecten islandicus, Müll. Varanger and Klosterelv Fiords.
—— *tigrinus*, Müll. Lang Fiord.
—— *septemradiatus*, Müll.
—— *imbrifer*, Lovén.
—— *grœnlandicus*, Sow. Varanger and Bog Fiords, in 80–125 fathoms.
Limea Sarsi, Lovén.

Mytilus edulis, Linn. In several places.

Modiola modiolus, Linn. Lang and Klosterelv Fiords.

—— *phaseolina*, Phil. Vadsö and Lang Fiord.

Modiolaria discors, Linn. Among Corallina in rock-crevices between tide-marks at the back of the island which forms the harbour of Vadsö.

—— *lævigata*, Gray. Bog and Lang Fiords, in 10–30 fathoms.

—— *nigra*, Gray. In all the Fiords, but not abundant, and I saw no large specimens, 10–125 fathoms.

—— *corrugata*, Steenst. Lang Fiord, in 15–25 fathoms.

Dacrydium vitreum, Möll. Varanger, Bog, and Lang Fiords, in 30–125 fathoms.

Crenella decussata, Mont. Vadsö, and all Sydvaranger Fiords, in 15–125 fathoms.

Arca glacialis, Gray. Varanger and Bog Fiords, 30–125 fathoms.

Nucula tenuis, Mont. Abundant throughout the district.

—— *delphinodonta*, Migh.

Leda minuta, Müll. Throughout the district.

—— *pernula*, Müll. Throughout the district.

Yoldia limatula, Say. A dead specimen brought up in a small dredge which I threw out from the steamer when lying in a fog off the mouth of Laksefiord.

Portlandia lucida, Lovén. Varanger and Lang Fiords, in 25–125 fathoms.

—— *intermedia*, M. Sars. Varanger, Lang, and Bog Fiords, 80–125 fathoms.

—— *lenticula*, Fabr. Varanger, Lang, and Bog Fiords, in 5–100 fathoms.

—— *frigida*, Torell. In all the fiords, in 5–125 fathoms.

Astarte compressa, Linn. (= *A. elliptica*, Brown). In all the fiords of Sydvaranger, in 5–50 fathoms.

—— *borealis*, Chemn. Lang Fiord, Tromsö and Svolvær.

var. *placenta*, Mörch. Klosterelv Fiord, 5 fathoms.

—— *crebricostata*, Forbes. Varanger, Lang, and Klosterelv Fiords, in 5–125 fathoms.

—— *striata*, Leach (= *compressa*, Mont., non Linn.). Vadsö; Lang and Klosterelv Fiords, in 5–25 fathoms. Species showing considerable variation. A striking feature in East Finmark is the great abundance of Nuculidæ and Astartidæ.

Turtonia minuta, Fabr. Tide-marks, Vadsö and Klosterelv Fiord.

**Montacuta bidentata*, Mont. Svolvær.

*—— *ferruginosa*, Mont. Svolvær.

—— *Maltzani*, Verk.

**Cardium echinatum*. Svolvær.

—— *elegantulum*, Beck. Varanger, Lang, and Bog Fiords, 25–125 fathoms.

—— *ciliatum*, Fabr. (= *islandicum*, Chemn.). Varanger, Lang, and Klosterelv Fiords, 5–25 fathoms.

—— *fasciatum*, Mont. In all the fiords, also at Tromsö and Svolvær.

Serripes grœnlandica, Linn. In Laminarian zone throughout the district.

Cyprina islandica, Linn. Klosterelv Fiord, 2–5 fathoms. The extreme profusion in which this species occurs in the Glacial Clays of Scotland I had always supposed to be a state of things which had entirely passed away; until at Svolvær, Lofoten Islands, I found *Cyprina* living in the same extraordinary abundance. The shore there is densely strewn with the dead shells and their comminuted remains which have been cast up.

Venus gallina, Linn. Vadsö.

—— *casina*, Linn. "Vardö," *fide* Lovén.

Timoclea ovata, Penn. Svolvær. Entered by Sars as found in East Finmark.

Thyasira flexuosa, Mont.

var. *Sarsii*, Phil. Vadsö, Klosterelv and Bog Fiords, and at Svolvær.

var. *Gouldii*, Phil. Varanger, Lang, and Bog Fiords, 20–125 fathoms.

—— *obesa*, Verrill. Vadsö, in 10–25 fathoms.

Axinopsis orbiculata, G. O. Sars. Vadsö and all the Sydvaranger Fiords, in 2–50 fathoms.

Lucina borealis, Linn. Svolvær. Sars records it from East Finmark.

Mactra elliptica, Brown. Vadsö.

—— *subtruncata*, Da Costa. Lang Fiord. A single specimen.

**Syndosmya prismatica*, Mont. Svolvær.

Tellina balthica, Linn. Very abundant; living between tide-marks in Klosterelv and Lang Fiords. The shells are of comparatively small size, with a dull chalky-like surface. The substance of the Klosterelv shells is white, while that of almost all those from Lang Fiord is pink.

—— *calcarea*, Chemn. Vadsö; Lang and Klosterelv Fiords; also Svolvær.

*—— *fabula*, Gmel. Svolvær.

Mya arenaria, Linn. Vadsö; Klosterelv Fiord; Svolvær.

—— *truncata*, Linn. One dead, Klosterelv Fiord.

Corbula gibba, Olivi.

Panopea norvegica, Spengler. Dead valves, perhaps fossil, in Klosterelv Fiord. Sars records this from West but not from East Finmark.

Saxicava rugosa, Linn. Common throughout the district.

var. *arctica*, Linn. Occasional.

Thracia truncata, Brown. Varanger and all the Sydvaranger Fiords, 3–30 fathoms.

Cuspidaria arctica, M. Sars. This very large and fine species was found in the Varanger and Bog Fiords in 80–125 fathoms, but very rare.

—— *glacialis*, G. O. Sars. Varanger Fiord; rare in 100–125 fathoms.

—— *subtorta*, G. O. Sars. Varanger, Lang, and Bog Fiords, in 3–30 fathoms.

—— *obesa*, Lovén.

Poromya granulata, Nyst and West. "Porsanger Fiord," *fide* Friele.

Brachiopoda.

Terebratulina caput-serpentis, Linn., var. *septentrionalis*, Couth. Lang and Bog Fiords, in 5–100 fathoms.

Eudesia cranium, Müll. Lang Fiord, 25 fathoms. A single broken specimen.

Rhynchonella psittacea, Gmel. Varanger, Lang, and Bog Fiords, in 15–30 fathoms.

Of the Mollusca found in East Finmark the following are not as yet known elsewhere:—

Philine fragilis.
Dendronotus velifer.
Bela expansa.
Siphonorbis Verkruzeni.
Scalaria obtusicostata.
Cingula tumidula.

The following are North American, and not found elsewhere on the Norwegian coast:—

Liostomia eburnea.
Thyasira obesa.
Cuspidaria arctica.

The following are Arctic species which reach East Finmark, but are not known further south on the Norwegian coast:—

Bela simplex.
Siphonorbis lachesis.
Alvania Jan-Mayeni.
Cingula castanea.
Velutella cryptospira.
Marsenia groenlandica.
Lunatia nana.
Machæroplax varicosa.
Turritellopsis acicula.
Portlandia intermedia.
Cardium ciliatum.
Serripes groenlandicus.
Montacuta Maltzani.
Cuspidaria glacialis.
—— *arctica.*

The following species have not been found under more arctic conditions than those existing in East Finmark:—

Typhlomangelia nivalis.
Spirotropis carinata.
Taranis cirrata.
Odostomia turgida.
—— *unidentata.*
—— *turrita.*
Pyrgulina eximia.
—— *spiralis.*
Eulima bilineata.
Alvania Jeffreysii.
Jeffreysia globularis.
Marsenia prodita.
Gibbula tumida.
Pilidium fulvum.
Hanleyia debilis.
Pecten tigrinus.
—— *septemradiatus.*
Limea Sarsi.
Modiola phaseolina.
Venus gallina.
—— *fasciata.*
Lucina borealis.
Mactra subtruncata.
Corbula gibba.

A comparison of this list of East Finmark Mollusca with two Norwegian catalogues which I have previously published will illustrate the changes in the Molluscan Fauna as we go further north up the Norwegian coast (see Norman, "Mollusca of the Fiords near Bergen," Journal of Conchology, vol. ii. 1879, p. 8; and "A Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist. ser. 6, vol. xii. 1893, p. 341).

[To be continued.]

L.—*On a new Species of* Paramithrax *from New Zealand.* By George M. Thomson, F.L.S.

[Plates VII. & VIII.]

In the course of a trawling-cruise round the coasts of this colony undertaken by the Marine Department numerous trials of the inshore fishing-grounds were made by Mr. Ayson, Inspector of Fisheries, in the small chartered steamer the 'Doto.' In the course of one of these trials off Cape Saunders a number of specimens of the fine new crab described in this paper were obtained at a depth of about 50 fathoms and at a distance of some 10 miles off shore. It is rather remarkable that, though trawling has been carried on for a year or two now, the same species should not, so far as I am aware, have been met with again. There are no doubt periods of seasonal migrations even of such slow-moving creatures as crabs, for on a more recent occasion, but only once, the trawl brought up a great many specimens of *Prionorhynchus Edwardsii*, a